

That Which Is Claimed:

1. A method of modifying a physical property of a nanotube, said method comprising:

5 subjecting a nanotube having a defined lattice structure orientation to stress conditions sufficient to disrupt the lattice structure and form a dipole of dislocation cores therein, and wherein the dipole of dislocation cores split and propagate in the nanotube in a manner such that the dislocation cores are separated by at least one domain of modified lattice structure, and wherein the
10 physical property of the nanotube is altered.

2. The method according to Claim 1, wherein the physical property is an electrical property.

3. The method according to Claim 1, wherein said nanotube comprises carbon or boron nitride.

4. The method according to Claim 1, wherein said subjecting step further comprises subjecting the nanotube to thermal conditions.

5. The method according to Claim 4, wherein said subjecting step is carried out at a temperature ranging from about 500°C to about 1800°C.

6. The method according to Claim 1, wherein said subjecting step
25 results in the nanotube elongating from about 3 to about 10 percent.

7. The method according to Claim 1, wherein said method further comprises the step of subjecting the nanotube to radiation.

30 8. The method according to Claim 7, wherein the radiation is ultraviolet light.

10. The method according to Claim 1, wherein said subjecting step comprises subjecting the nanotube to stress selected from the group consisting of tensile stress, torsional stress, bending stress, and combinations thereof.

11. The method according to Claim 1, wherein said nanotube has a defined lattice structure orientation characterized by a (10,10) chirality vector, and wherein the domain of modified lattice structure has a chirality vector of (10,9).

12. A method of modifying a physical property of a carbon nanotube, said method comprising:

subjecting the carbon nanotube having a hexagonal core lattice structure to stress and thermal conditions sufficient to disrupt the lattice structure and form a dipole of pentagon-heptagon and heptagon-pentagon dislocation cores therein, and wherein the dipole of dislocation cores propagate throughout the nanotube in a manner such that a domain of modified lattice structure is formed between the dipole of dislocation cores to alter a physical property of the nanotube.

13. The method according to Claim 12, wherein the physical property is an electrical property.

14. The method according to Claim 12, wherein said subjecting step is carried out at a temperature ranging from about 500°C to about 1800°C.

15. The method according to Claim 12, wherein said subjecting step results in the nanotube elongating from about 3 to about 10 percent.

16. The method according to Claim 12, wherein said method further comprises the step of subjecting the nanotube to radiation.

17. The method according to Claim 16, wherein the radiation is selected from the group consisting of ultraviolet radiation, x-ray radiation, and combinations thereof.

18. The method according to Claim 12, wherein said subjecting step is carried out such that at least one heterojunction is formed in the nanotube.

19. The method according to Claim 12, wherein said subjecting step comprises subjecting the nanotube to stress selected from the group consisting of tensile stress, torsional stress, bending stress, and combinations thereof.

20. The method according to Claim 12, wherein said nanotube has a defined lattice structure orientation characterized by a (10,10) chirality vector, and wherein the domain of modified lattice structure has a chirality vector of (10,9).

21. A carbon nanotube comprising:

a dipole of pentagon-heptagon and heptagon-pentagon dislocation cores located in an opposed spaced-apart relationship along a longitudinal axis of said carbon nanotube;

a first region comprising a domain of modified lattice structure positioned between said dipole and formed by said dipole propagating throughout the nanotube as a result of stress being applied to said nanotube; and

second and third regions each positioned on opposite sides relative to said first region, the second and third regions comprising lattice structure domains which differ from the domain of modified lattice structure in said first region such that said second and third regions possess a physical property different from the first region.

21. An article of manufacture comprising the nanotube defined in Claim 20.

5

22. A method of modifying a chemical functionality of a nanotube, said method comprising:

providing a nanotube having a dipole of dislocation cores present therein and a reactive component;

10

reacting the reactive component and the nanotube such that the chemical functionality of the nanotube is altered.

23. The method according to Claim 22, wherein the reactive component reacts with at least one of the dislocation cores.